

## CLAIMS:

1. A method for using magnetic resonance images obtained by a magnetic resonance imaging scanner which generates a magnetic field with a magnetic center (isocenter), as origin for locating anatomical targets (2) in a patient (1), wherein at least one fiducial marker (4, 5) is applied to the body (1) of the patient at a distance from the isocenter, comprising the following steps:
  - obtaining a first magnetic resonance image of the anatomical target (2), wherein the anatomical target (2) has an accurate geometrical position,
  - obtaining a second magnetic resonance image at a shifted position, wherein the fiducial marker (4, 5) has an accurate geometrical position; and
  - merging the accurate geometrical position of the target (2) and the accurate geometrical position of the fiducial marker (4, 5) in a single image.
2. A method as claimed in claim 1, wherein the first image is obtained at a position of the patient within said scanner wherein the anatomical target (2) is located in close vicinity to said isocenter and the second image is obtained at the shifted position of the patient within said scanner wherein the fiducial marker (3, 4) is located in close vicinity to said isocenter.
3. A method as claimed in claim 2, wherein the shift of the patient (1) relative to the isocenter is measured and the accurate geometrical positions of the target (2) and the fiducial marker (4, 5) are determined by the measured shift of the patient (1).
4. A method as claimed in claim 2, wherein a composite image data set is built up by merging the first and second images by overlapping corresponding parts in the images to said single image.
5. A method as claimed in one of claims 1 to 4, wherein an optimal Field-of-View ( $FOV_{opt}$ ) is determined having geometrical positions with a prescribed accuracy and the first and second images are provided within said optimal  $FOV$ .

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6. A method as claimed in one of claims 1 to 5, wherein said fiducial markers are applied left (4) and right (5) laterally on the patient.
- 5 7. A method as claimed in one of claims 1 to 5, wherein said fiducial markers (6;7;8;9) are applied laterally on both sides anterior and posterior on the patient.
8. A method as claimed in one of claims 1 to 5, wherein said fiducial markers (10,11) are applied anterior or posterior on the patient.
- 10 9. A method as claimed in one of claims 5 to 8, wherein the steps of  
- shifting the patient (1),  
- obtaining magnetic resonance images, and  
- merging the accurate geometrical positions of the target and the fiducial
- 15 marker are repeated successively and accordingly for all further fiducial (4;5;6;7;8;9,10,11) markers until all markers are imaged within the optimal FOV.
10. A magnetic resonance imaging system which generates a magnetic field with a  
20 magnetic center (isocenter), as origin for locating an anatomical target (2) in a patient (1) wherein at least one fiducial marker (4, 5) is applied to the body (1) of the patient at a distance from the isocenter, the magnetic resonance imaging system comprising:  
- means for acquiring a first magnetic resonance image of the anatomical target (2), wherein the anatomical target (2) is imaged at its accurate geometrical position, and  
25 - means for acquiring a second magnetic resonance image at a shifted position relative to the first magnetic resonance image, wherein the fiducial marker (4, 5) is imaged at its accurate geometrical position.
11. Magnetic resonance imaging system as claimed in claim 10, further  
30 comprising an image processing system for merging the accurate geometrical position of the target (2) and the accurate geometrical position of the fiducial marker (4, 5) in a single image.

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12. A magnetic resonance imaging system as claimed in Claim 10 or 11 comprising:

- means for scanning the patient to develop a magnetic resonance image data set of the patient (1), which means allows the movement of the patient (1) sideways,
- 5 - a patient table which permits to reposition the patient (1) in the left-right direction to bring various regions of interest across the patient (1) in close vicinity of the isocenter of the magnetic field.

13. System, in particular a workstation or a radiotherapy planning system, having  
10 an input to receive

- a first magnetic resonance image of an anatomical target (2), wherein the anatomical target (2) is imaged at its accurate geometrical position, and
- a second magnetic resonance image at a shifted position relative to the first magnetic resonance image, wherein the fiducial marker (4, 5) is imaged at its accurate  
15 geometrical position, and
- being provided with an image processing system for merging the accurate geometrical position of the target (2) and the accurate geometrical position of the fiducial marker (4, 5) in a single image.

20 14. A magnetic resonance imaging method to

- acquire first magnetic resonance image of the anatomical target (2), wherein the anatomical target (2) is imaged at its accurate geometrical position, and
- acquire a second magnetic resonance image at a shifted position relative to the first magnetic resonance image, wherein the fiducial marker (4, 5) is imaged at its accurate  
25 geometrical position.

15. A computer programme to control an magnetic resonance imaging system comprising the instructions to:

- acquire first magnetic resonance image of the anatomical target (2), wherein  
30 the anatomical target (2) is imaged at its accurate geometrical position, and
- acquire a second magnetic resonance image at a shifted position relative to the first magnetic resonance image, wherein the fiducial marker (4, 5) is imaged at its accurate geometrical position.

16. A computer programme as claimed in Claim 15 comprising instructions to merge the accurate geometrical position of the target (2) and the accurate geometrical position of the fiducial marker (4, 5) in a single image.
- 5 17. A computer programme as claimed in claim 15 or 16, further comprising the instructions to:
  - apply at least one fiducial marker (4;5) to the body (1) of the patient at a predetermined distance from the isocenter;
  - position said patient within said scanner such that an anatomical target (2) to
- 10 18. be visualized is located in close vicinity of said isocenter; and
  - shift the patient (1) in such a way that the fiducial marker (4;5) is close to the isocenter;
- 15 19. A computer programme comprising instructions to:
  - receive first magnetic resonance image of the anatomical target (2), wherein the anatomical target (2) is imaged at its accurate geometrical position, and
  - receive a second magnetic resonance image at a shifted position relative to the first magnetic resonance image, wherein the fiducial marker (4, 5) is imaged at its accurate geometrical position and
- 20 20. - for merging the accurate geometrical position of the target (2) and the accurate geometrical position of the fiducial marker (4, 5) in a single image.